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ABSTRACT

Three different analytical approaches to assessing the economic return to be derived from the two-year college degree are examined in this paper. Introductory comments discuss the conditions that gave rise to interest in assessing the economic pay-off of both two- and four-year college degrees. Next, the paper analyzes the economic costs and benefits of beginning work after high school, earning a two-year college degree, and obtaining a four-year college degree, using and explaining the following approaches: (1) constructing an age earnings profile based on census data to trace the path of a person's lifetime income; (2) calculating lifetime income by determining the worth of future income in terms of present dollar values; and (3) establishing the internal rate of return on the investment in schooling. In the next section, the effects of an individual's willingness to incur risk are incorporated into the value calculations. Finally, brief concluding remarks summarize each analytical method and assert that calculating income alone as a benefit of education underestimates the rate of return to be derived from all forms of education. Graphs, tables, and formulas are included. (MPH)

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WHAT IS THE ECONOMIC PAY-OFF TO A COMMUNITY COLLEGE DEGREE ?

by Richard M. Romano+

Somewhere in the mid-1970's a great many people began to question whether it was worth going to college. Slower rates of economic growth resulted in rising unemployment and the press dramatized the plight of the unemployed Ph.D. and other college graduates who had to accept jobs well below their expectations. Studies by economists seemed to confirm that the economic advantage of a 4-year college education was falling. Increasingly, students turned toward vocational programs and away from the general 4-year liberal arts degree. All of this helped boost enrollments at the 2-year community colleges* which offered a variety of low cost vocational programs that seemed to hold the promise of immediate employment. To some, perhaps many, of the students who flocked to the community colleges,it might have seemed that it was somehow "better" to get a 2-year degree than a 4-year one. If we accept an admittedly narrow definition of "better" as refering only to the economic rewards of a college education then, at least in one important respect, this was not the case. Data from the most recent 1980 census confirms the connection between education and earnings. If we look at national averages, those with a 4-year college degree earn more over their life-time than those with lower levels of education. This does not

* In this article the terms 2-year college and community college are used interchangeably.

mean that some students were not better off having started at the 2-year college or that the accessibility of these local colleges has not expanded educational opportunities. This is certainly true, but it is also true that a 4-year college degree opens the door to most of the higher paying professional occupations.

Census data from which these generalizations arise, however, must be approached with some caution. One reason for this is that the data does not clearly identify those with 2-year degrees nor does it isolate those who started at the community college and went on to complete a 4-year degree. In addition, the data does not reflect the differences in the cost of acquiring education. When considering the economic pay-off from a 2-year or a 4-year college degree, differences in costs, as well as benefits, must be considered. Since a major benefit, to the individual, of obtaining a 2-year degree is believed to be an increase in future earnings it is surprising that so little has been written about this subject. This article will examine three different approaches to assessing the economic return to a 2-year degree: 1) the value of life-time income, as shown in the age-earnings profiles derived from Census data, 2) the present value of life-time income, and 3) the rate of return on the investment[3] in schooling.

The age earnings profile

One way of comparing the economic pay-off to different levels of education is to use census data to construct an age earnings profile. The profile can be depicted as a line on a graph which traces the path of a person's life-time earnings.

The U.S. Census Bureau has been collecting data on age, educational level, and earnings, since 1940. Unfortunately this

data does not distinguish between those individuals with 1 to 3 years of college completed,the official Census category, and those with a 2-year college degree. By lumping all of the 2-year college graduates into this category,it is impossible to distinguish them from those who dropped out of a 2 or 4-year college without completing a degree. These groups could have different age earnings profiles,but it is not clear, for instance, whether the 2-year graduates profile would be higher or lower than that of the individual who started at a 4-year college but completed only 1 to 3 years of schooling. Consequently, available data do not allow us to draw an age earnings profile for the community college graduate with any degree of accuracy. However, some strong inferences about the path of the average 2-year public college graduates earnings can be made from data available on individuals who have completed other levels of schooling.

Jacob Mincer [1],among others, has examined 1960 census figures extensively and charted the average earnings of individuals in particular age groups according to the highest level of schooling completed. Figure 1 reproduces his chart for white non-farm males.

Figure 1 here

The 13-15 schooling group, which would include those with just a 2-year degree, has a profile that is closer to that of the average high school graduate than to that of the average 4-year college graduate. We have no way of telling whether the 2-year graduate is on the high side of this range or not. For this reason it is safest to assume that the income path of the 2-year graduate

is about the same as that of the 13-15 group. A hypothesized path for the 2-year graduate is presented in Figure 2. It is a rough sketch of the earnings data reported in the 1980 Census shown in Table 1. The typical age-earnings profile shown in Figure 1 has been modified to include the costs of higher education which are treated as a negative benefit. In moving from the figures in Table 1 to their graphic representations in Figure 2, we have also assumed that 12 years of schooling represents the high school graduate and 16 years of schooling the 4-year college graduate. This would not always be the case but it is a reasonable approximation for our purposes. Data used here is for males but earnings for other groups show a similar pattern.

It is important to mention that this hypothesized path is drawn with the "typical" college freshman in mind. That is, we are dealing with a group of students who are full-time first-time undergraduates. This group does not represent the fastest growing segment of community college students,since it excludes part-time students and those adults who are returning to college after some absence. As Astin [2] has pointed out,however, the full-time first-time student is still a very important part of the community college population,and for our purposes represent the only meaningful group for which comparable national data exists.

Table 1 here

Figure 2 here

Data for Table 1 and Figure 2 from:

U.S. Bureau of Census. Subject Reports, Earnings by Occupation and Education, PC 80-2-8B, May,1984.

Valena White Plisko(ed.), The Condition of Education 1984 edition, National Center for Education Statistics, Wash.D.C.,1984.

As Figure 2 shows we have no reason to believe that the trajectory of the earnings path of the 2-year graduate would be any different than that of the other educational groups. It increases rapidly for the first decade or so after work starts and then tends to level off from around age 40 to about age 60. This is followed by some decline in earnings as retirement age is approached and entered. The path is projected to fall somewhere between those of the high school graduate and the 4-year graduate because ,in addition to the strong indication given by Census data that this may be the case ,the full-time first-time entrants into the 2-year college have identifiable characteristics which are predictive of future income and lie somewhere between these two groups [3,4,5]. In contrast to the student who begins at the 4-year college,for instance,the 2-year entrant:

1. Comes from a family of lower socio-economic orgins (family income, eduational level of parents,and parents occupational status).

2. Has not achieved as good a record of academic performance in high school and has lower measured academic ability.

3. Has lower educational aspirations.

As previously stated,we have assumed that the 2-year college graduate's lifetime income path is close to that of the 13-15

schooling group,except for some modifications in the 18-24 age bracket. These modifications and the profiles of the three groups were drawn in Figure 2 using assumptions which have a reasonable amount of empirical support. The assumptions are:

1. Starting salaries do not differ widely but by age 30 the earnings patterns of the three groups are established. Those with more education have a higher income path [6,p.42].
2. The starting salary of the 4-year grad. is lower,at age 22 or 23,than the income of the high school grad. because job experience and training more than compensate for the difference in education. By around age 25 the earnings of these two groups are equal [7,pp.39-40].
3. The peak of earnings for the 4-year grad. is at a higher age than for the high school grad. but both drop off in the 55-64 age bracket [7,p.39].
4. A large part of the private cost of a 4-year degree is foregone earnings (indirect costs). Other, direct costs,include tuition and the extra expense of housing, meals, etc.(costs that exceed those of non-students),less any aid and part-time wages. (Cost assumptions here are based on attendance at a public college.)

The path of the 2-year college graduate is based on the following additional assumptions, of which 2,3 and 4 are educated guesses:

1. The private costs of going to college are less than the cost of the first two years of going to a 4-year public college. This follows from the fact that the two year student is much more likely to live at home and work part-time while

attending college full-time. Thus,both the private direct costs and the private indirect costs (foregone earnings) are less.

2. At age 20 the starting salary would be below that of the high school grad.,but at around age 22 the two would be equal.
3. The 4-year grad. would overtake the 2-year grad. at around age 29. After that the profile of the 2-year grad. would fall somewhere between that of the other two,as the Census data for the 13-15 schooling group show.
4. The 2-year college is not likely to promote the social mobility of its students to a greater degree than any other type of schooling.

Discounting to get present values

Looking back at the information presented in Figure 2, can we say that the average 18 year old who does not get as much education as possible has made a mistake? Not necessarily. If we assume away any other benefits of education, it turns out that we can't even say that the lifetime income represented by the upper path is higher, in the relevant sense, than that of the lowest path. This is because a dollar's worth of income expected 40 years from now is worth a lot less than a dollar's worth of income expected next year. All expected future income must therefore be discounted at some rate to give us the present value of the lifetime income stream, which then becomes the relevant value to consider. In order to see how this works, and to keep the calculations manageable, we will present a simplified version of the 3 paths shown in Figure 2, where the direct and indirect costs

of going to college are treated as negative benefits. Let's say that we have an individual who ,at the end of his 18 th. birthday (high school graduate),must decide whether to take path A (go to work), path B (get a 2-year degree), or path C (get a 4-year degree).

Path A promises:

$10,000 per year for 6 years

$17,000 per year for 20 years

$20,000 per year for 21 years

Present value at 4% discount rate = $ 336,213

12% discount rate = $ 113,408

Path B promises:

-$ 6,000 per year for 2 years

$ 19,000 per year for 24 years

$ 24,000 per year for 21 years

Present value at 4% discount rate = $ 377,980

12% discount rate = $ 256,700

Path C promises:

- $11,000 per year for 4 years

$23,000 per year for 22 years

$32,000 per year for 21 years

Present value at 4% discount rate = $ 455,526

12% discount rate = $ 224,799

It is evident from our example that path C (4-year degree) is preferred if we choose a 4% discount rate but path B (2-year degree) is better if the discount rate is raised to 12%. If we raised the discount rate high enough we could show that it would not "pay" to go to college at all (path A). Given this relationship, it is tempting to hypothesize that those who attain only the lower levels of education discount future earnings at a higher rate than those who acquire college degrees. Under these conditions,the decision not to continue with schooling would be a rational one,since the present value of earnings from lower levels of education would be equal to the present value of earnings from higher levels of education. We will reflect on this question again in the last section of the paper but, for now, we can certainly say that the above analysis illustrates that the choice of a discount rate is a critical determinant of which life-time earnings path is higher. Therefore,we must be careful in making generalizations about the earnings superiority of investing in a particular amount of schooling, when looking at the typical income-age profiles projected by Census data.

Rates of Return

Another way of looking at this matter is to estimate the costs and benefits of taking either of the three paths and then to solve for the rate of discount which equates the present value of these costs and benefits. The resulting percentage, generally called the internal rate of return by economists, represents the annual expected rate of return to be derived from investing in a particular amount of schooling. For education to be worthwhile, from purely an earnings standpoint, the rate of return should

equal or exceed that of alternative uses of the money. Studies of this sort have generally shown that putting your money into schooling compares favorably with alternative forms of investment.

Calculations of the rate of return (r) to schooling would follow the general form of the equation:

$$\sum_{a=1}^{n} \frac{(B-C)_a}{(1+r)^a} = 0$$

where B= annual benefits; C= annual costs; n= number of years in the labor force after leaving school.

Rates of return may be estimated in this way for both the individual (ie. private--considering only the direct and indirect costs and benefits to the student), and the society (ie. social--private + the additional benefits and public subsidies to education). Given the benefits and costs that we can measure,we would generally expect to find a higher rate of return to the individual than to the society from investing in public higher education. Table 2 summarizes the results of some of the studies that have been done by economists on the rates of return to a 4-year college education.

Table 2 here

Very few studies of this type have been done on the 2-year graduate,chiefly due to the lack of national data on this group. On a priori grounds, however, we might expect the rate of return to a 2-year degree to be somewhere between that of a high school graduate (usually in the 13-20% range) and a 4-year college graduate (usually in the 8-13% range). Some 2-year colleges have tried to verify this hypothesis by conducting studies on their own graduates but faulty methodology or incomplete data have hampered these efforts. The few more reliable efforts to estimate the rate of return to 2-year graduates do appear to show higher rates of return than those to the 4-year graduates [14,15]. If this is the case, would it not contradict our expectation that the age-earning profile of the 2-year graduate is lower? Not necessarily, because the typical age- earnings profile, projected from Census data,does not reflect the costs of education,and this would allow the rate of return to be higher while the profile remains lower. In addition, on the benefit side, the studies on 2-year graduates almost always collect earnings data from one or two points early in the graduate's work life cycle. This is a period in which earnings are rising the most rapidly,as we have seen by looking at the age-earnings profiles. In fact,in their early working years,the 2-year graduates earnings might be expected to rise more rapidly than those of the 4-year graduate,because the former's education is more likely to be job specific and specialized than the latter's education. The broader objectives of the typical 4-year education,especially in the liberal arts,might be expected to pay off over a longer time period. Thus, if data on the earnings of 2-year graduates is collected from their early working

years and projected into the future without taking into account the eventual flattening out of the age-earnings profile, the analysis will show a highly inflated rate of return to the 2-year graduate.

Risk and Uncertainty

In constructing our example of the present value of a future stream of earnings,where an individual at age 18 was faced with selecting path A,B, or C,we assumed that factors which affect income other than schooling did not matter. This is clearly an over simplification of reality and it must be recognized that part of the observed differences in earnings by education level are attributable to other factors such as ability, motivation, and socioeconomic origin. Careful studies of the rates of return to schooling, such as those we have cited, attempt to control for variations in these other factors to the extent possible. One of the other factors affecting income which is seldom mentioned , however,is the willingness to incur risk.

Other things being equal,our student at age 18,who is faced with a choice of one of the three paths,cannot be sure that any of them will result in the expected payoff. The decision to attend a 2-year or a 4-year college, for instance, even if graduation can be assurred, involves some risk since actual future earnings cannot be calculated with certainty. One way to incorporate this risk component into our analysis is to add a "risk premium" to the discount rate that we used in our present value calculations. This would increase the discount rate as the riskiness of the choice is increased. If, for a particular person, the risk of going to a 4-year college is perceived, for any reason, to be higher than

that of going to a 2-year college, then the future stream of earnings for the 4-year choice would have to be discounted at a higher rate. Higher discount rates for 4-year than for 2-year paths could easily make the latter the logical choice for certain groups of students. From this viewpiont the 2-year college can be seen as an institution which often services students, or their parents, who are low risk takers. These students are more reluctant to leave their home community to go to college or to work after college. They are more likely to select a curriculum which is vocational in nature and holds the promise of a specific job than a curriculum like liberal arts which is broader in scope and leads to a longer run payoff. They are more likely,on average, to be oriented toward the present than the future. In addition to the longer commitment of time it takes to complete a 4-year degree, all of these factors could cause a student to apply a higher discount rate to obtaining a 4-year degree than to obtaining a 2-year degree.

Based on the inferential evidence available to me on the characteristics of students who enter 2-year colleges, and on my own casual observation of student behavior at both levels over the last 20 years, I believe that first-time full-time students who choose to attend the 2-year college are lower risk takers than their peers who start at a 4-year college. The 2-year college, thus, increases access to higher education for a group of students who have an aversion to risk. In order to test this empirically, of course, we would need to develop an independent measure of risk aversion among high school students.

Concluding remarks

In this paper we have shown that the analytical devices of the age-earnings profile, present value calculations and rate of return analyses can be useful in promoting clear thinking about the income benefits to be derived from obtaining a 2-year college degree. We have also introduced the variable of risk as a determinant which might influence the type of college attended. It should be remembered that we have made no mention of the the benefits to be derived from education other than income. Such a narrow focus surely underestimates the rate of return to all forms of education. As one influential researcher has said,

> "Benefits from education may indeed take many forms, some of which- and possibly the most important- defy measurement in money terms."[16,p.99]

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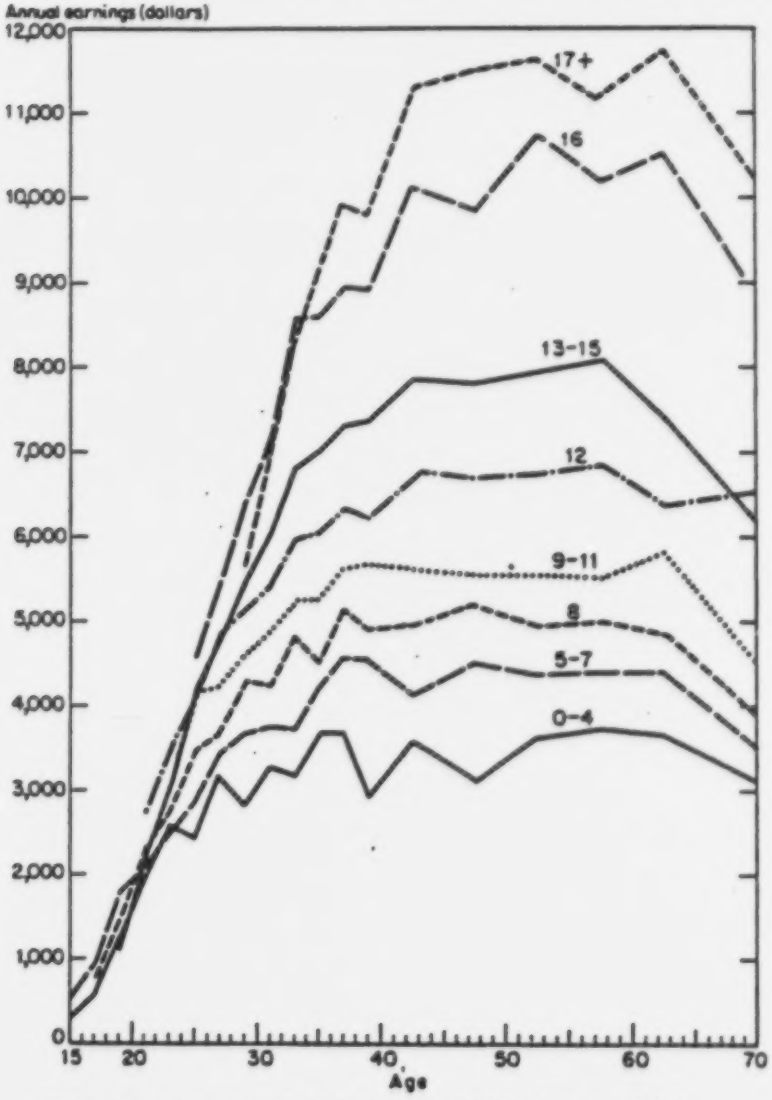
Figure 1

AGE PROFILES OF EARNINGS OF WHITE, NONFARM MEN, 1959
(annual earnings classified by years of age, for indicated schooling groups)



NOTE: Figures on curves indicate years of schooling completed.
SOURCE: 1/1,000 sample of U.S. Census, 1960.
Mincer [1], p. 66.

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FIGURE 2 Age-Earnings Profiles by Education Level

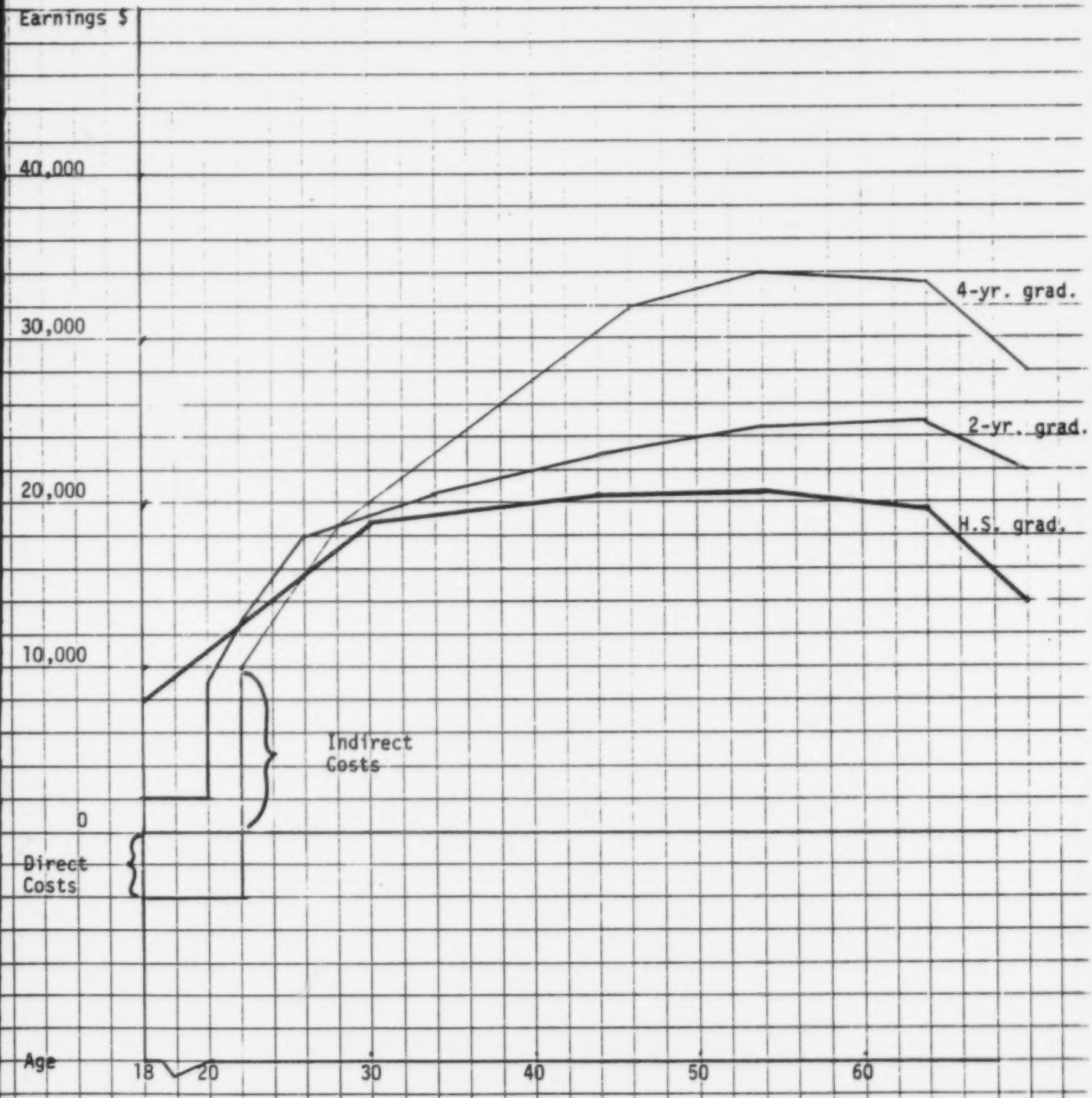

TABLE 1. Mean Annual Earnings of Experienced Civilian Labor Force - Full-time Male Workers (1979)

Age Group	Years of Schooling Completed		
	12	13-15	16
25 - 34	$16,233	$17,399	$19,859
35 - 44	19,904	22,862	29,491
45 - 54	20,869	24,306	33,864
55 - 64	20,259	24,514	33,218
65 +	18,406	23,228	29,860

TABLE 2. Private and Social Rates of Return to Investment in Four Years of College Education in the U. S.

Author(s)	Sample Year	Rate of Return (%) Private	Social
Hansen [8]	1950	11.4	10.9
Becker [9]	1940	14.5	
	1950	13.0	
	1956	12.4	
	1958	14.8	
Hanoch [10]	1960	9.6	
Mincer [1]	1960	10.0	
Carnoy and Marenback [11]	1940	21.4	10.7
	1950	13.2	10.6
	1960	17.6	11.3
	1970	15.4	10.9
Raymond & Sesnowitz [12]	1970	17.9	14.3
Freeman [13]	1968	11.0-12.5	12.0-13.0
	1973	7.5-10.0	8,5-10.5

(Source: Cohen [7, p. 116]

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